

## Sustainable Construction and Technological Innovation

Academic Year:

**2018/2019**

|                 |  |                      |      |      |   |          |   |      |            |
|-----------------|--|----------------------|------|------|---|----------|---|------|------------|
| Course          | Master's degree in Conservation and Rehabilitation |                      |      |      |   |          |   |      |            |
| Scientific Area | Conservation and Rehabilitation                    |                      |      |      |   |          |   |      |            |
| ECTS Credits    | 6,0  | Curriculum Unit code | CSIT | Year | 1 | Semester | 1 | Type | Compulsory |
| Prerequisites   |  |                      |      |      |   |          |   |      |            |

**Contact Hours:**

|                  |    |                            |     |                                   |       |
|------------------|----|----------------------------|-----|-----------------------------------|-------|
| Lecture Sessions | 15 | Lecture-Practical Sessions | 30  | Practical and Laboratory Sessions |       |
| Tutorial         |    | Placement                  |     | Seminar                           |       |
| Fieldwork        |    | Other                      | 7,5 | Autonomous Study                  | 109,5 |

|             |  |          |                            |
|-------------|--|----------|----------------------------|
| Responsible | Susana Maria Melo Fernandes Afonso Lucas | Position | Visiting Adjunct Professor |
| Lecturers   |  | Position |                            |

|                   |  |
|-------------------|--|
| Learning Outcomes | <p>Discuss the environmental impact of construction, especially the building sector, listing the main adverse factors on the environment and measures of sustainable construction with special emphasis on building systems and unconventional materials, processes and innovative systems.</p> <p>The student should be able to:</p> <ul style="list-style-type: none"> <li>-implement practices of technological innovation in real examples;</li> <li>-implement sustainable practices in the design, implementation, maintenance and demolition of buildings.</li> </ul> <p>Specific competences:</p> <ul style="list-style-type: none"> <li>- transmit information and ideas equating problems;</li> <li>- ensure the quality of projects in technological, economic, social and environmental areas;</li> <li>- formulate alternative solutions and / or innovative;</li> <li>- Prepare proposals coherent and consistent</li> </ul> |
|-------------------|--|

|          |  |
|----------|--|
| Syllabus | <p>Chapter 1 -Sustainable development Sustainability and environmental impact. Sustainable construction and planning. Lifecycle. Ecological footprint. National Strategy.</p> <p>Chapter 2-Measurements of sustainable construction Energy efficiency: bioclimatic design and passive solar technologies. Daylighting. Hydro efficiency. Energy and environmental performance of materials. Management and environmental monitoring. Environmental management plan.</p> <p>Chapter3- Unconventional solutions Land construction and Light Steel Framing .</p> <p>Chapter 4- Evaluation and certification of sustainability National and international systems.</p> <p>Chapter 5-Technological innovation Background and objectives of innovation. Types of innovation: incremental, radical, disruptive. Invention versus innovation. Innovative products.</p> <p>Chapter 6-Intellectual property and copyright Patent innovation. Requirements to be patentable. Cooperation Treaty. Elaboration of a patent.</p> |
|----------|--|

|                        |   |
|------------------------|---|
| Teaching Methodologies | <p>Theoretical lectures using audio-visual means; Theoretical and practical lectures analysing and discussion case studies with examples of implementation of measures of technological innovation and / or sustainable construction. Activities of e-learning that encourages self-awareness and communication skills as well as oral presentations by the students.</p> |
|------------------------|---|

|            |  |
|------------|--|
| Evaluation | <p>1. Theoretical exam, with a weighting of 60% of the final grade, rated on a scale of 0 to 20, with a minimum grade of 9.5 v;</p> <p>2. Case study with a weighting of 40% of the final grade, rated on a scale of 0 to 20, with a minimum grade of 9.5 v;</p> <p>The admission examination is subject to approval in Case Study. The final classification should be equal to or greater than 9.5 v.</p> |
|------------|--|

## Sustainable Construction and Technological Innovation

Academic Year:

**2018/2019**

**Evidence of the syllabus coherence with the curricular unit's intended learning outcomes**

The following skills are developed:

1. analyse the impact of a solution or building system;
2. propose innovative and sustainable measures;
3. assess the sustainability of such measures;
4. innovate in materials, construction methods and systems; as well as the development of cognitive and behavioural work in an organization or a team.

**Evidence of the teaching methodologies coherence with the curricular unit's intended learning**

The teaching methodology adopted provide student with an overview of the fundamental aspects of sustainable construction and technological innovation. Case studies consolidate the knowledge acquired. The case study evaluation has the tutor guidance, and encourages the ability to search, analyze, evaluate, organize, plan and create solutions. The e-Learning activities stimulate research, analysis, evaluation and search for new solutions, also help the development of case study. This approach motivates students to acquire the competencies at the level of understanding of concepts and practical application.

**Bibliography**

Fagerberg, J.; Mowery, D.; Nelson, R. — The Oxford Handbook of Innovation — Oxford University Press, 2005.  
 Tidd, J.; Bessant, J. — Managing Innovation — Wiley, 2006.  
 Schilling, M. — Strategic Management of Technological Innovation — McGraw-Hill, 2005.  
 O'Sullivan, D.; Dooley, L. — Applying Innovation — Sage, 2008.  
 Pinheiro, Manuel Duarte — Ambiente e Construção Sustentável — Instituto do Ambiente, 2006.  
 Tirone, Livia — Construção Sustentável — Tirone Nunes, 2007.  
 Mateus, Ricardo; Bragança, Luís — Tecnologias Construtivas para a Sustentabilidade da Construção — Edopy, 2006.  
 Bragança, Luís — Portugal SB07 - Sustainable Construction - Materials and Practices, Challenge of the Industry for the New Millenium — Amsterdam, IOS Press, 2007.  
 Torgal, F. Pacheco e Jalali, Said (2010). A sustentabilidade dos materiais de construção, TecMinho

**Observations**